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*A clinical study of
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A CLINICAL STUDY OF
TWO HUNDRED AND NINETY-THREE CASES OF
PULMONARY TUBERCULOSIS

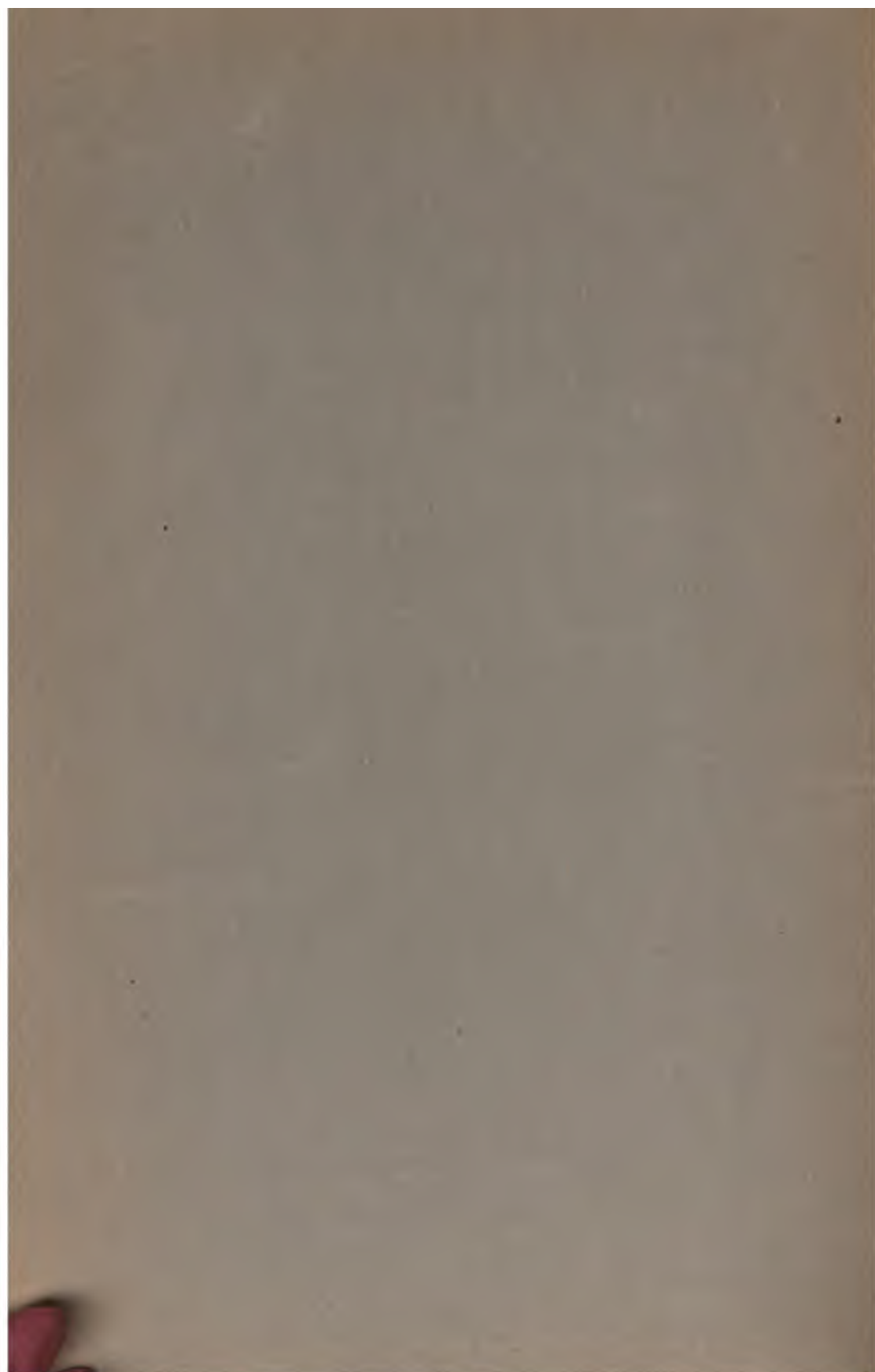
TREATED AT

The Winyah Sanitarium, Asheville, N. C., in 1905 and 1906
With Special Reference to Specific Medication and Its Results

BY

Karl von Ruck, M. D., and Silvio von Ruck, M. D.

ASHEVILLE, N. C.,
1907.



A CLINICAL STUDY OF TWO HUNDRED AND NINETY-
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BY

KARL VON RUCK, M.D., AND SILVIO VON RUCK, M.D.
Asheville, N. C.

In the present report of 293 cases of pulmonary tuberculosis we have adopted the classification of stages and results according to the form recommended by the National Association for the Study of Tuberculosis.

We do this for the purpose of making our statistical data uniform with others, but with a sacrifice of a certain degree of prognostic value as concerns the grouping of stages, or classes of cases in which the National Association thought best to comply with Turban's method, probably because the latter is largely used in Europe and the Committee wished to make American statistics conform with those of other countries.

We are, however, still of the opinion that the grouping of cases as they come under treatment, having for its object the comparison of eventually obtainable results, cannot be based upon the extent of physical signs, or of local alterations disclosed by them, simply because they do not necessarily stand in relation to the prospect of improvement and recovery; and because even if they did, differences in the skill of physical examination, or in the interpretation of signs by different observers, would necessarily vary to a degree that individual statistics of results obtained could not be comparable.

The cases subject to the present report were classified on admission from a purely prognostic standpoint, and in re-arranging the classification a number of cases from our most favorable group (*A*) had to be changed to the moderately advanced stage, while of our previous group (*B*) not a few cases needed to be put into the far advanced stage. On the other hand several cases which we had grouped with class (*C*) required to be moved forward to the second stage although the prognostic outlook was exceedingly doubtful.

As heretofore we report no cases that were treated for less than a month. Concerning the results obtained that amount to less than an apparent cure or arrestment of the disease, it should be stated that but for a premature discontinuance of treatment by the patient, many of the improved cases could have appeared as cured or arrested in the table which follows:

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RESULTS IN 293 CASES OF PULMONARY TUBERCULOSIS.

STAGE	General			Appar. Re- covered			Disease Ar- rested			Improved			Stationary			Progressive		
	Number treated	Per cent. of all cases	Average duration of treatment days	Number	Per cent.	Average days treated	Number	Per cent.	Average days treated	Number	Per cent.	Average days treated	Number	Per cent.	Average days treated	Number	Per cent.	Average days treated
I. Incipient.	43	14.8	130	40	93.0	134	3	7.0	77	0	0	0	0	0	0	0	0	0
II. Mod. ad- vanced...	134	45.7	171	75	56.0	225	44	32.8	108	12	9.0	92	0	0	0	3	2.2	51
III. Far ad- vanced...	116	39.5	139	35	30.1	210	35	30.4	140	25	21.5	106	4	3.5	91	17	14.7	112
Totals	293	100	154.2	150	51.2	194.4	82	28.0	120.5	37	12.6	101.1	4	1.3	91	20	6.9	102.3

INFLUENCE OF TREATMENT ON SYMPTOMS.

Fever was present on admission in 250, or 85.3 per cent. of all cases: Not exceeding 100°F. in 92, or 36.8 per cent.; over 100°F., not exceeding 101°F., in 87, or 35.8 per cent.; over 101.5°F. in 71, or 28.4 per cent.

Fever was present on discharge in 106 cases, or 36.2 per cent., including 4 patients who died in the institution: Not exceeding 100°F. in 60 cases, or 56.6 per cent.; over 100°F., not exceeding 101.5°F. in 25 cases, or 23.6 per cent.; over 101.5°F. in 21 cases, or 19.8 per cent.

There were free from fever on admission 43, or 14.7 per cent.; on discharge 187, or 63.8 per cent.

Cough, Expectoration and Tubercle Bacilli.

Cough, or cough and expectoration, were present in all but 3 cases on admission, and without taking into consideration the degree of cough and amount of expectoration the difference between admission and discharge is as follows:

Cough and expectoration on admission 266, or 90.8 per cent.; on discharge 101, or 34.4 per cent.

Cough only, on admission 24, or 8.2 per cent.; on discharge 32, or 10.9 per cent.

Neither cough nor expectoration on admission 3, or 1.0 per cent.; on discharge 160, or 54.6 per cent.

In 266 cases which had expectoration, tubercle bacilli were found on admission in 251, and on subsequent examinations in 14, making a total of 265, or 90.4 per cent.

On their discharge tubercle bacilli were still present in 139, or 47.4 per cent.

Attention is directed to the fact that in all but one case in which expectoration was present tubercle bacilli were also found, if not on the first, then on repeated examinations with the aid of the centrifuge. While

EXPERIMENTAL

its persistent use added thus 14 instances of bacillary sputum in which the bacilli, as a rule, disappeared at an early period, this advantage to the number of cases reported as free from tubercle bacilli on discharge, is counter-balanced by the greater number of 17, in whose sputum they could be demonstrated only on repeatedly resorting to the same critical search.

Night Sweats.

Night sweats were present on admission in 87 cases or 29.7 per cent.; on discharge in 11 cases or 3.8 per cent. All the cases in which this symptom persisted were instances of progressive disease, and in which the sweats, though, as a rule controlled by the usual remedies, returned on their omission.

Weight.

The usual increase in weight in improving patients was observed with the same regularity as noted in our cases previously reported. Loss of weight since the beginning of the pulmonary disease had occurred in 32 cases of the incipient stage and in all but two patients in the advanced stages, averaging 7 pounds for the former, 15½ pounds for the moderately advanced, and 18 pounds for the far advanced stages. All the 43 patients in the incipient stage gained, and 131 of 134 cases in the moderately advanced stage, and 81 in the far advanced stage showed increase as compared with their weight on admission, the average gain for 255 cases being 14 pounds. An increase of from 1½ to 12 pounds over any previous weight was noted in 65 cases.

TUBERCULOUS COMPLICATIONS AND THEIR FREQUENCY.

One or more tuberculous complications were present in 173 patients, the total number of such complications being 197.

Bones and Joints	3.	=	1.0 per cent.
Digestive Tract: Mouth, tongue	2.	=	0.7 " "
" " : Intestine	16.	=	5.5 " "
" " : Rectum, ulcer	1.	=	0.3 " "
" " : " fistula	4.	=	1.3 " "
Ear: Otitis media	3.	=	1.0 " "
Eye: Iritis	1.	=	0.3 " "
Genitalia: male	1.	=	0.3 " "
Lymph glands	15.	=	4.8 " "
Mammary glands	1.	=	0.3 " "
Larynx	139.	=	47.4 " "
Nose	6.	=	2.0 " "
Peritoneum	1.	=	0.3 " "
Skin: Ulcer	1.	=	0.3 " "
" : Lupus	1.	=	0.3 " "
Urinary Organs: Kidney	2.	=	0.7 " "

Results Obtained by Treatment.

Bones and Joints: As to the results of treatment of the co-existing tuberculous complications we may briefly state that in the 3 cases of bone and joint tuberculosis there were:—

One case of tuberculosis of the knee joint which was improved; the patient, however, suffered a relapse on account of trauma occasioned by a fall.

One case of tuberculosis of the sacro-iliac joint, and shoulder which apparently recovered. Two injections of iodoform emulsion were made into the shoulder joint. The sacro-iliac disease had developed subsequently to an operation years ago upon the tuberculous hip joint, and the patient was helplessly confined to bed when coming under our care. Her pulmonary affection was moderately advanced and large doses of morphine had been necessary to control the pain of the bone and joint affection. On discharge the lung disease was apparently cured, and the general condition of the patient excellent and much better than at any time in her previous history.

The third case was one of caries of the second rib, evidently an extension from the subjacent destructive process in the lung. Previously scraping of the rib had been resorted to, but the cicatrix broke open, leaving a fistulous discharging tract which led to the carious bone. Both the lung and bone affection were apparently cured and the patient, discharged nearly two years ago, has suffered no relapse.

Mouth, tongue: Two cases of tuberculosis of the tongue were treated, one case with ulcer of the anterior portion involving also the floor of the mouth, which was greatly improved, with entire subsidence of pain and irritation, and was cicatrizing when the patient left the Institution. The second case in a young girl, aged 20, involved the posterior part of the tongue on both sides; there were an indurated base and undermined edges on one side, while on the other the process was more superficial. Miliary tubercles could be seen peripheral to the superficial ulcer; both ulcers involved areas corresponding to about one-half inch in diameter. Local reactions were observed frequently, and healing occurred promptly. Before coming under our care other methods of treatment had not only failed, but the affection had extended. In the diagnosis syphilis was positively excluded. The patient was dismissed, cured after a little over three months' treatment, having made great improvement in her general condition as well, by an increase of over 30 pounds in weight.

Intestine: In the 16 cases of intestinal tuberculosis the clinical symptoms were sufficiently marked, even if tubercle bacilli had not been demonstrated in the fæces, to leave little if any doubt of the presence of

ulceration. In 9 of the cases the symptoms subsided, and there was no return on the resumption of an ordinary diet. In 4 cases the symptoms were much improved, while in 3 cases they could be only more or less controlled. In these cases opium with acetate of lead appeared most serviceable in checking the diarrhoea, the addition of the lead salt appearing of striking benefit. The much better results in the present cases as compared with the cases of our last report may, of course, be a matter of coincidence, and we fully appreciate that so small a number of cases does not justify conclusions of the therapeutic value of remedies employed, but we are nevertheless of the opinion that the use of Styrcol in large doses and for prolonged periods has been of material aid in the treatment of this most undesirable complication of the cases discharged, as also in a number of others still under treatment.

Rectum: One case of tuberculous deep ulceration of a lupus-like form about the anus in an advanced and eventually fatal case appeared much improved, under the use of X-Rays combined with other measures.

In the 4 cases of tuberculous fistula tubercle bacilli were demonstrated in 3. In 2 cases healing without operation was accomplished. One case was improved, and in one case there was no material change on discharge.

Ear: *Otitis media* was present in 3 cases and in one of these the affection was bilateral. Two were cured in the sense that the discharge entirely stopped, and the drum perforations cicatrized and contracted, with material improvement in hearing in one case; the third case improved as to the amount of discharge from the ear.

Eye, Iritis: One case of tuberculous iritis in a moderately advanced case of the lung affection was first supposed to be rheumatic, the patient giving a history of rheumatism. More careful examination later, after anti-rheumatic treatment had failed, revealed distinct miliary nodules, and on resorting to specific treatment marked local reaction occurred. The tubercles disappeared and the symptoms subsided under the use of Watery Extract of Tubercle Bacilli.

Lymph Glands: In 15 cases glandular tuberculosis involving the cervical and axillary groups, with sufficient enlargement of individual glands to direct attention, was recorded.

In all but two cases local reaction occurred under specific medication. In 5 cases the enlargement subsided entirely, the glands being no longer palpable; in 7 others this was true of some of the glands, while others remained unchanged. In 1 case two axillary glands softened, broke down and discharged, but healing occurred promptly; in 2 cases of chronic indurated glands there was no change.

Mammary Gland: In a single woman, age 25, both glands were tuberculous; also the axillary lymph glands of both sides which appeared

to have been affected first. The mammary glands were tender and swollen, and the outer portion of each was the seat of several movable, indurated somewhat irregular nodes, the largest the size of a small walnut.

Differentially other possible affections were excluded, and the slow development, the lymph gland tuberculosis of the axillary group, as well as unmistakable and frequent local reactions to specific treatment, especially on increase of doses, left little if any doubt of the tuberculous nature, which was further confirmed by the gradual reduction of the nodes until they had disappeared. On discharge no reaction occurred to tuberculin; the patient likewise recovered from her pulmonary disease.

Larynx: Under the classification of the National Association the presence of tuberculous complications removes the case from the incipient or favorable class, which as far as the larynx is concerned would, in our experience, be justifiable only in instances of deep ulcerations, or of extensive superficial ulcerations and infiltrations of its parts. The slighter degrees of infiltration, and even circumscribed superficial ulcerations have yielded in our hands so readily to specific treatment, that we have long ceased to look upon them as influencing the prognosis.

In the present series were 117 cases with tuberculous infiltrations, all confirmed by the occurrence of local reaction to Tubercle Bacillus Extract, or tuberculin, and while in about half the cases the infiltrations were slight, there were numerous instances in which their location and size interfered with complete inspection of the true cords and subglottic region, and yet in no single instance did the infiltration break down and form ulcer.

In 60 of the cases or 51.3 per cent., the infiltration disappeared entirely. In 39, or 33.2 per cent. the size and extent were greatly diminished but more or less thickening was left.

In 18 cases, or 15.4 per cent., the reduction in size and extent of the infiltrations was but slight or barely appreciable, all being cases in which local reaction occurred but once or a few times, without further change. We are of the opinion that in these and other instances there was a natural tendency to a spontaneous cure, and that such a result occurs much more frequently than is usually believed to be the case.

Ulcerations were present in 22 cases of which 9, or 40.9 per cent. were cured; 5, or 22.7 per cent. were improved, the ulceration being in process of healing when the patients left the Institution. There was no change in one case which was treated but a little over a month; in 7 cases, all in the far advanced stage of phthisis, the result was negative.

Taking infiltrations and ulcerations together there were 139 cases or 47.4 per cent., of which were cured 69, or 50 per cent.; improved 44, or 31.5 per cent.; but slightly improved or unchanged 19, or 13.5 per cent.; and grown worse 7, or 5 per cent.

Nose: In six cases with tuberculous ulcer of the nose, one with perforation of the septum, the ulcers were completely healed in 5; and in 1 case the ulcer was healing on discharge.

Peritonitis: There was only one case, with co-existing intestinal tuberculosis, and the patient was far advanced in lung disease and otherwise greatly emaciated and exhausted. The result of treatment was negative and but a short trial was made.

Skin: A case of lupus of the face, with a moderately advanced lung affection was greatly improved in both respects when the patient left the Institution, expecting to return for further treatment.

One case of tuberculosis of the skin was of the true ulcerating variety. The ulcer healed, and there has been no relapse in 18 months since the patient's discharge.

Urinary Organs, Kidney: Two cases of tuberculosis of the kidney were treated. The lung affection was slight in one case and far advanced in the other. In the former case the diagnosis was not positive, inasmuch as tubercle bacilli had not been found in the urine, but the co-existing symptoms made the diagnosis more than probable. This patient remained only two months and left the Institution free from symptoms.

The second case presented all essential diagnostic features with tubercle bacilli in the urine, which on discharge had become free from all morphological elements. The urine could be retained all night and micturition was not unduly frequent during the day. Previous pain had disappeared.

OTHER COMPLICATIONS.

The following non-tuberculous complications were recorded in 98 patients, or 33.4 per cent. of the total number of 293 cases.

Albuminuria	14	=	4.8	per cent.
Asthma	3	=	1.0	" "
Diabetes mellitus	1	=	0.3	" "
Diazo Reaction	39	=	13.3	" "
Digestive Organs: Colitis	6	=	2.0	" "
" " Diarrhoea, non-tuberculous	6	=	2.0	" "
" " Gastric catarrh	10	=	3.4	" "
" " Gastric catarrh with dilatation .	2	=	0.7	" "
" " Dyspepsia	64	=	21.8	" "
Heart: Hypertrophy with dilatation	15	=	5.1	" "
" Tachycardia	15	=	5.1	" "
Hemoptysis	6	=	2.0	" "
Malaria	1	=	0.3	" "
Nephritis, chronic interstitial	2	=	0.7	" "
Pleurisy with effusion	1	=	0.3	" "
Pregnancy	1	=	0.3	" "
Syphilis	3	=	1.0	" "

Albuminuria in one case was due to amyloid of the liver, kidney and intestine, and amyloid of the kidney was suspected in two more cases.

In 11 other cases which were all of slight degree, as in the preceding, the urine showed neither casts nor other morphological evidences. In these the albuminuria stood probably in relation to fever which was present in all. The albumen disappeared entirely in 6, was found in traces only occasionally in one, while in 5 it persisted and was still present when the patients were discharged improved.

Asthma was present in 3 cases antedating the phthisis in two, and developing in its early course in one. The latter case recovered completely. One case was improved, and one case was uninfluenced except by symptomatic treatment; but slight improvement was obtained in the local lung condition, and the patient after four months' stay in the Institution was advised to return home where he since died.

Diabetes occurred in one case with co-existing rapid softening and extension in the lung affection; a short period of treatment proved of no avail; the sugar in the urine diminished, however, under less dietetic restrictions than had previously been followed.

Diaso Reaction: This supposedly unfavorable prognostic sign was noted in 39 cases in a well marked degree. In five cases it occurred in a comparatively early period of the lung disease, but with well marked fever, and in no other case was the temperature entirely normal.

So far as our observations go, the reaction seems closely associated with caseous softening and suppuration and disappears when free drainage has become established. The reaction disappeared under such circumstances in 27 cases; it persisted in 12 cases in varying degrees, in 8 of which the conditions which we believe to stand most often in relation were evident and progressive. Four of the cases had tuberculous ulceration of the intestine; one of them with co-existing peritonitis.

Digestive Organs: *Chronic colitis* was present in 6 cases, all females, originating evidently from chronic constipation with faecal impaction at the sigmoid flexure. The presence of this condition until discovered and removed seriously interfered with the general improvement, on account of reflex gastric disturbances and diarrhoea. By the use of high enemata and massage 3 cases were entirely cured, 2 very much improved, and 1 improved.

Diarrhoea was noted in 6 cases, apparently of non-tuberculous origin, and of indeterminate immediate cause except in one case in which amyloid of the intestine was suspected and eventually confirmed.

In the other five patients the diarrhoea had existed for periods of several months to a year prior to coming under our care. The stools were found liquid, evacuations occurred from 2 to 6 times a day, unattended by pain or tenesmus, the faeces contained more or less undigested food

remnants, especially meat fibres; there was neither pus nor mucus to suggest ulceration or catarrh. Under dietetic regimen some improvement was noted. The administration of digestive ferments and acids, astringents, or bismuth had apparently no influence, but the use of Styrcol seemed to render valuable aid. In 2 cases complete cure was obtained under its use; 2 cases were greatly improved; in 1 case in which Styrcol was, however, not prescribed the diarrhoea could be controlled only with opiates (paregoric).

Gastric catarrh was present in 10 cases, and in 2 additional cases it was attended with decided dilatation. Under the usual methods of diet, electricity, lavage and vibratory massage, 3 cases were completely relieved, 1 (with dilatation) was much improved, 4 cases were improved, and in 4 cases (2 with a history of abuse of alcohol) no material lasting benefit followed our efforts.

Digestive disturbances of slighter degree, usually due to constipation, errors in diet, etc., were noted in 64 cases, the majority of which yielded to a proper regimen. One case of nervous anorexia persisted in spite of every effort. Repeated examinations of the gastric secretions and motility showed nothing abnormal, the food taken with great aversion appeared to be well digested, and while forced feeding was tolerated a decided gain in weight was accomplished. Later the patient vomited the food unless a full dose of morphia preceded its administration. The previous gain was soon lost and the patient was advised to go home or elsewhere for a change, of the result of which we have no information.

Heart: In our last bi-annual report¹ we have called attention to certain heart conditions indicative of degenerative changes in the right ventricular wall and to their frequent relation to physical over-exertion. Our present series of cases confirms us in our view of the detrimental influence of heart strain, and of the unfavorable prognostic significance of a weak ventricle as expressed by a weak second pulmonic sound, when attended by tachycardia and shortness of breath on exertion.

A number of such cases offering themselves for treatment were declined. In 7 cases admitted in which the condition was not so well marked, while we succeeded in bringing about amelioration, only one of them was so far improved that a complete clinical result was obtained. Referring the reader to our fuller consideration of this subject we again emphasize the importance of the regulation of rest and exercise in the light of their influence upon the circulation, and our belief that exercise to a degree to cause shortness of breath and an unduly rapid pulse, is the more detrimental and significant of harm done, the longer its influence is evident on the resumption of rest. Much rather would we allow that patient a moderate degree of physical exercise whose temperature is elevated, if it can be taken without unduly influencing his circulation

and respiration, than the one who, although the temperature is normal and remains so after the exercise, shows shortness of breath, or a materially increased pulse rate half an hour after the exercise is completed.

Hemoptysis: The careful supervision of our patients as concerns their circulation and the regulation of rest and exercise in the light of its influence on it, we believe to stand in the closest relation to the comparatively rare occurrence of pulmonary haemorrhage in our cases. In the 293 patients here considered, we had the remarkably small number of six who suffered from this complication. While this is the smallest percentage of hemoptysis we have reported, it is not a matter of coincidence entirely, the previous reports of the Institution since 1888 varying between 2.5 and 4.5 per cent.

In our last report, we have stated our position concerning the influence of hemoptysis upon the course of phthisis, and have there critically examined the opinions and evidence in regard thereto. To this, we would refer the reader who may be inclined to attach less importance to its avoidance than we do.

In the treatment of the six cases that occurred in the 2 years since, we have made use of *veratrum viride* with a view of reducing the blood pressure which was determined frequently during the administration of the remedy. The method appeared to work admirably in one case, the only severe one in the six. The keeping of the pressure for a week about 10 to 15 mm. Hg. below the point determined at the time of the hemoptysis, required but very small doses. There was no recurrence. With slighter degrees of hemoptysis in the other five patients the experience was the same, and it would have been easy to become optimistic in the belief that the lowering of blood pressure and its control for a sufficient length of time would bring the treatment of hemoptysis from the empirical upon a proper physiologic basis, and thus within easy control. Had we allowed ourselves to indulge in such a view we should have been undeceived by this time, the method having recently failed; in spite of the most painstaking control and lowering of the pressure the bleeding continued, when resort to adrenalin coincided with the prompt cessation of the expectoration of blood. There was apparently no good reason, either from a consideration of the physical signs and the inferred pathologic changes, or from the study of the blood pressure before, during and after the hemoptysis, or from other evidence why in this case, a remedy with practically opposite physiologic action should have been followed by the desired result.

Malaria was a complication in only one case; the patient who had well marked physical signs with progressive destructive changes in one upper lobe had, however, not been aware of his lung affection, and had received treatment on account of his malaria only, until a week prior to his

admission. Plasmodia were found, and the malarial affection yielded promptly to quinine.

In two other cases prolonged treatment for malaria had been followed prior to admission, the patients claiming to have had constant assurance by the attending physician that the lungs were sound, until a hemoptysis in the one and an attack of exudative pleurisy in the other caused these patients to seek our advice.

Nephritis: Chronic interstitial nephritis was present in two cases. It appeared to have no detrimental influence upon the favorable progress of one case in which an apparent recovery from the lung affection was accomplished. The nephritis had existed several years prior to the advent of phthisis, which was moderately advanced when the patient was admitted. The per cent. of albumen was small and remained so, and the patient is still in good health a year after his discharge. In the second case the phthisical process was far advanced, and the various examinations of the urine made in the course of two months while the patient was under our care showed no material variation in the albumen per cent., nor in morphological elements found. The patient was discharged improved.

Pleurisy: Attacks of so-called dry, circumscribed pleurisy occurred in a number of cases during their stay in the Institution. In their symptomatic treatment we found the use of the high-frequency current to frequently obviate the necessity of counterirritation or of opiates when the local pain was more severe and required interference. The effect of the current varied greatly in its duration; in a number of cases a single application was sufficient, in others the pain returned after a varying period of relief, sometimes in a few hours.

Pleurisy with effusion was noted in only one case on admission, it being the one mentioned above as having been treated for malaria. Of chronic cases of pleurisy with pleural thickening and adhesion we may mention in particular nine cases in which the daily application of tincture of green soap to the skin appeared to give excellent results. The tincture was applied with friction at bed time, and the seat of application washed with warm water on the following morning. The improvement was unmistakable in all these cases, and was evidenced by disappearance of catarrhal rales in the adherent lung, by a better percussion note in cases where the thickening had been sufficient to change it, by better lung excursion in instances where previously no change or but little was observable between inspiration and expiration, and by the disappearance of pain or discomfort in the respective parts of the chest. These results seem to be gratifying the more because the treatment is so simple, and rarely requires longer than six weeks or two months, and likewise because the condition is as a rule quite refractory to other methods of procedure, and its removal of greatest importance to the final recovery of the patient.

Pregnancy was a complication in only one case, the patient coming under treatment in the third month, in 1905, with active progressive changes in both lungs. She was treated for 4 months when she returned to her home with the disease arrested and her general health excellent. Her delivery was normal, and on the completion of further treatment she left the institution now 18 months ago apparently recovered, with an increase of weight of 33 pounds compared with that of her first admission, and an excess of 13 pounds over any previous weight in her life.

Concerning the prognostic influence of complicating pregnancy, an examination of our records for 10 years prior to 1905, shows that it does not appear as unfavorable as is frequently held by writers on this subject. We find that during the time stated 22 pregnant women have been treated, 16 of whom, however, were in a comparatively early stage of their lung affection. Of those who had not completed their treatment before delivery seven returned thereafter for further treatment.

Of the 22 cases are known to be living 14; of whom are in good health 11; in fair health 3; 6 are known to have died, and 2 were lost sight of. Eight of the 14 living patients have borne children since; in one case 3 births, in 3 cases 2 births, and in 4 cases 1 birth each, have not been followed by relapse. In only one of the 22 cases treated did it appear necessary to interrupt the existing pregnancy.

Two of the living patients had also laryngeal tuberculosis, one a rather extensive infiltration of the posterior wall, with ulcer of one true cord; the other had infiltration of both vocal processes and of one of the cords. In the first case the ulcer was healed and the infiltration had grown less before delivery, and on her return 3 months later the remaining infiltration had practically disappeared. In the second case the infiltration of the vocal process was improved before delivery, but the cord remained thickened and the voice still husky. No relapse has followed, although no further treatment was resorted to.

Syphilis was a complication in 2 cases, both patients showing late manifestations. Antisyphilitic treatment was combined with other methods and discontinued after the symptoms had been removed. Neither the syphilis nor its treatment appeared to interfere with their favorable progress and both patients were dismissed with their disease arrested.

PERMANENCY OF RESULTS.

An enquiry as to the permanency of the results reported since 1897 has been concluded on Dec. 31, 1906. It takes into consideration all cases previously reported that had obtained a clinical result, of whatever degree, while 96 cases which failed to improve or grew worse were not included in the enquiry.

Circular letters with detailed questions that were deemed essential to be answered were sent to 777 patients; from 602 replies were received. For convenience we have prepared a table which is self-explanatory:

FINAL RESULTS IN 602 CASES OF PULMONARY TUBERCULOSIS DISCHARGED 2 TO 10 YEARS AGO.

Stages	Years in which patients were discharged.	No. originally reported	Failed to improve under treatment	Recover'd or improved under treatment	Total No. traced	Reported as Cured				Reported Greatly Improved				Reported Improved				Permanent Result in							
						Were traced	Have died	Are living	Have relapsed	Were traced	Have died	Are living	Have relapsed	Are in good health	Were traced	Have died	Are living	Have relapsed	Cases reported as recovered	Cases reported as greatly improved	Cases reported as improved	Total number	Per cent.		
Early. Class A	1897 1898	20	0	20	14	14	2	12	0	12	0	0	0	0	0	0	0	0	12	0	0	12	85.7		
	1899 1900	53	0	53	37	34	0	34	0	34	2	0	2	0	2	1	0	1	34	2	1	34	100.		
	1901 1902	53	0	53	43	40	3	37	2	35	2	0	2	0	2	1	0	1	35	2	1	35	88.4		
	1903 1904	45	0	45	45	44	1	43	4	39	0	0	0	0	0	1	0	1	39	0	1	39	88.9		
	Totals	171	0	171	139	132	6	126	6	120	4	0	4	0	4	3	0	3	120	4	3	127	91.4		
Middle. Class B	1897 1898	37	0	37	24	19	2	17	3	14	4	0	4	1	3	1	0	1	14	3	1	14	75.2		
	1899 1900	80	0	80	62	42	6	36	2	34	16	3	13	1	12	4	2	0	34	12	2	34	77.4		
	1901 1902	139	0	139	102	60	5	55	4	51	28	3	25	4	21	14	4	10	51	21	9	51	79.4		
	1903 1904	94	0	94	77	65	2	63	3	60	7	0	7	1	6	5	4	1	60	6	0	60	85.7		
	Totals	350	0	350	265	186	15	171	12	159	55	6	49	7	42	24	10	14	159	42	12	213	80.4		
Advanced. Class C	1897 1898	21	2	19	13	2	1	1	0	1	6	3	3	1	2	5	4	1	1	2	1	1	4	30.8	
	1899 1900	92	29	63	46	14	4	10	2	8	18	7	11	5	6	14	12	2	1	8	6	1	15	30.6	
	1901 1902	117	29	88	70	36	10	26	7	19	18	8	10	4	6	16	12	4	3	1	19	6	26	37.1	
	1903 1904	122	36	86	69	30	10	20	7	13	20	4	16	4	12	19	14	5	1	4	13	12	4	29	42.0
	Totals	352	96	256	198	82	25	57	16	41	62	22	40	14	26	54	42	12	5	7	41	26	7	74	37.4
All Stages	Summary	873	96	777	602	400	46	354	34	320	121	28	93	21	72	81	52	29	7	22	320	72	22	414	68.8

In regard to enduring results in patients who were at the time of discharge reported as improved only, it should be stated that with few exceptions they were further treated by their family physicians under such directions as we deemed essential, which included the continuance of specific treatment in the form of the administration of Watery Extract of Tubercle Bacilli which has been the remedy employed in the Institution since 1897. In many instances such patients returned to the Institution for a short stay of a week or two for necessary examinations and further advice, and although some of them were eventually brought to a more favorable state of health, and lost their symptoms entirely, we have not changed the designation of the attained result, it having been accomplished subsequently to their discharge; the fact that these patients have not grown worse since their discharge being all that we wish to show.

The table shows that of the original number of 873 patients we failed to obtain improvement in 96, all of whom belonged to the far advanced and prognostically most unfavorable class. It was not a part of our enquiry to find out what became of them, because improvement after we had failed was improbable, and in case it should have occurred, and some of the patients were still living, we could not claim the result for our work.

The tabulated results show that of 602 cases traced, were living without relapse 414, or 68.8 per cent. For the different stages we find the following:

Early Stage: All of the 171 cases treated in the early stage had obtained a clinical result on their discharge. Of that number were traced 139, or 81.2 per cent. Of the 139 had been dismissed as apparently cured 132. Six have since died (2 from other causes than tuberculosis), 6 have relapsed but are still living, and 120 claimed to have continued in good health. Four cases had been discharged as greatly improved, and 3 as improved. All 7 cases were further treated at home and are living, claiming to be in good health.

This gives for this stage 127 patients without relapse, living in good health for periods of from two to ten years, or 91.4 per cent. of all the cases that were traced.

Second Stage: All the 350 cases in the second stage were dismissed with a clinical result; of these were traced 265 or 75.7 per cent.

Of the 265 cases 186 had been dismissed as apparently cured; the enquiry shows that 15 have died; 4 deaths were from other causes than tuberculosis; 12 patients have relapsed but are still living; 159 or 85.4 per cent. of the cases traced continue in good health.

Of 55 cases dismissed as greatly improved 6 have died of tuberculosis; 7 have relapsed, 42 are living and in good health.

Of 24 cases who left the Institution improved, 10 have died of tuberculosis; 2 have relapsed and are living; 12 or 50 per cent. continue in good health.

In the second stage we have therefore 213 instances, or 80.4 per cent. of enduring results.

Third Stage: Of 352 cases in the third stage we recorded failures in 96 or 27.3 per cent. on their discharge, and 256 cases were originally reported as having attained a clinical result while under treatment. Of the latter were traced 198 or 77.3 per cent.

As apparently cured had been dismissed 82 patients, 25 of whom have since died, 3 of other causes; 16 have relapsed and are living; 41 or 50 per cent. are living in good health.

As greatly improved were dismissed 62 cases, 22 of whom have died of tuberculosis, 14 relapsed; 26 or 42 per cent. are living in good health.

As improved only were dismissed 54 cases; 42 have died of tuberculosis; 5 have relapsed and are living; only 7 or 13 per cent. are living in good health.

In the third stage we have of 198 cases traced 74, or 37.4 per cent. living in good health for periods from 2 to 10 years.

We, of course, have no other evidence than the patients' statements of their condition which they reported to us, and critical examinations would most likely show that among them, though enjoying a good or fair degree of health, there are instances in which the term cure could not be applied in its clinical sense. We likewise appreciate the fact that the whole number of patients originally treated was not traced. In 175 or 22.5 per cent of cases every effort to obtain information proved unsuccessful. Such a disadvantage attaches undoubtedly to every enquiry of this sort, and the statistics resulting become imperfect and lose in value. It is also probable that the results in the whole number would appear less favorable, inasmuch as the families of patients relapsed or dead, would take less interest in replying, than patients would who are gratified with the recovery of their health. That it would, however, be manifestly unfair to class all cases as dead or relapsed from whom no information is at hand we realized from the difficulties that our enquiry encountered, and the great number of second, third and even fourth letters necessary to bring information from patients who had not even changed their residence, and had evidently received those previously addressed to them. Belated replies are still occasionally being received, but too late, and not in sufficient number to justify the rearrangement of the tables and calculations.

THE VALUE OF SPECIFIC MEDICATION IN TUBERCULOSIS.

Were we, as did Trudeau in his enquiry concerning 185 cases treated with tuberculin², simply to take into consideration the number of patients

still living regardless of their state of health, we could add 62 cases which we classify as relapsed, and bring the total number of living patients to 476, or 79.1 per cent., for all stages.

We are not in a position to offer a series of cases treated during the same period by which we might demonstrate comparatively the value of specific medication in phthisis, as was Trudeau, nor do we consider that his comparison of 185 cases which received tuberculin with a differing number of 690 cases that did not receive it, in which only the question of living or dead is considered, gives any material light on the subject.

Curiously enough the small number of cases treated by Trudeau with specific remedies in 15 years is explained by him by the refusal of his patients to subject themselves to such medication, while the explanation we are obliged to offer for having no recent material for comparison is, that although sometimes prejudiced on admission, our patients after observing others who received specific treatment insisted upon receiving it also, and we recollect a number of patients whose condition appeared unsuitable, who left the Institution disappointed on account of our refusal. This was more particularly the case in the earlier years after the introduction of tuberculin, for when applying it and other less reliable or less safe products used prior to 1897, a much greater scrutiny was necessary in the selection of cases.

It is, however, gratifying to know that many years ago, and in spite of the general denunciation, Dr. Trudeau had formed the opinion that tuberculin when carefully administered has within certain limits a favorable influence upon the disease, and that the results of sanitarium treatment could be improved and made more permanent by its application. We believe that if at that time Dr. Trudeau had asserted the faith that was within him as emphatically as he now does, his influence could have aided greatly in overcoming a most unreasonable prejudice of the profession, and that a much larger number of his patients would probably have taken advantage of the benefits which he is convinced the remedy can confer.

In his paper on *Tuberculin*³, read at the New York Academy of Medicine, Dec. 19, 1901, there is little encouragement either to his patients or to the profession and the chief recommendation that he gave tuberculin then, was that he had observed no bad effects, that its sphere was limited to cases amenable to, but preferably treated by climatic and hygienic methods.

Specific remedies have been applied in the Winyah Sanitarium continuously since December, 1890, and the various reports made have shown superior results at all times, and these have grown better with improvements of the preparations and with the experience incident to their application and study.

While the professional opposition was trying and unpleasant, and deprived the Institution of the support of physicians who feared danger and injury to their patients, it is nevertheless gratifying to know, that that judgment which guided the faithful adherence to the method was not at fault, and that this faith was freely advocated and supported on all proper occasions. The result of the difficult, tedious, laborious and expensive enquiry concerning the question of permanency of the 602 cases dismissed from 2 to 10 years and tabulated above, speaks as nothing else can for our conviction which almost all recent writers with practical experience support.

The results reported by us heretofore and those of the present series need no comparison with cases in which specific treatment was omitted, there being no statistics from any source, from institutions or private practice, of a like number of cases and stages in which only the ordinary methods found application, that can in any way approach the results we are able to show.

In the use of the old tuberculin and its various more recent preparations, severe reactions followed by pneumonia, dissemination and acute miliary processes have been reported with much less frequency in recent years than in their earlier history. Severe reactions appear, however, not entirely avoidable, especially not with the tubercle bacillus emulsions, perhaps owing to the fact that no emulsion, however carefully prepared, admits of the accuracy of dosage that should be had with remedies which are active in amounts of one-hundredth, or even one-thousandth part of a milligram; and when the emulsified product is slow of, and differs in rapidity of absorption, as is the case with tubercle bacilli emulsions, cumulative effects must be expected occasionally if the treatment is not unreasonably prolonged.

Granting then that the old tuberculin and still more so the tubercle bacillus emulsions are not free from the liability to cause harm in certain rare instances, the reports of recent years show that this may probably be avoided in all but very few cases by those who have a particularly large experience and have given the subject of administration in regard to size, frequency and increase of doses, a great deal of care and study. The rare occurrences of such accidents can not be urged against their use, providing materially better results are obtained.

The profession has not taken a contrary position and could not justifiably take it in regard to other therapeutic agents. In the use of most remedies capable of doing good, accidents have occurred. We need but remind the reader of the use of mercury particularly in the treatment of syphilis, of digitalis in the treatment of diseases of the heart, of ergot in obstetrics, but most illustrative would be the use of anæsthetics, local or general, all of which have a history of accidents the greater,

the less they are understood by those who employ them, but not absolutely avoidable even in the hands of those who have the greatest experience and information.

Nevertheless, if danger, even in a small degree, attaches to one of them and this danger can be reduced or can be avoided entirely by substitution of another preparation which also accomplishes the desired result, or if such other preparation requires much less expert understanding in its administration, there can be no question as to which should be preferred, and such considerations, for instance, governed those who discarded chloroform for ether, or use Schleich's method for local anæsthesia instead of stronger solutions of cocaine.

A specific remedy which the less expert physician, like the general practitioner, can add to his resources for the successful treatment of tuberculosis, and use without risk, appears to us a desideratum second to none in the whole domain of therapeutics, and we believe that the preparation we have used will meet this requirement.

We have had but little to say heretofore concerning the choice of preparations in specific methods of treatment, and we have frequently classed the Watery Extract of Tubercle Bacilli, used in our work within the last ten years, with others which had given us less satisfactory, but nevertheless good results.

The remarkably favorable replies received from patients treated with it by us concerning the endurance of their recovery and improvement, and another collective enquiry of physicians who also have used it in sanatoria or in private practice, with the results to be considered further on, justify us in the claim of efficiency and safety to a degree that removes every objection for its more extensive application in general practice. Its method of preparation has been repeatedly published by one of us and by others who have reported cases treated with it, and needs no repetition here.

In evidence of its superiority, in efficiency as well as safety, we can offer our results and those of the physicians who have used it, with the statement that in not one of 1166 cases treated in our institution has there been a justifiable suspicion of a harmful influence, even from a single dose, and that in no case has any physician answered our question as to its safety other than affirmatively, some qualifying their answer with the remark, that the remedy was to be applied properly or according to directions, which is a condition implied with all potent remedies whatever their nature, regardless of the disease for which they are employed.

This uniform experience and acknowledgement of safety stands in contrast with other preparations, in the use of which accidents do still occur, some of them apparently unavoidable even in experienced hands,

and while, as heretofore stated, such accidents are now being reported much less frequently in tuberculin literature, they still occur occasionally. The last serious instance of this kind is recorded by Smidt,⁴ in the case of a patient in an early stage of the lung disease, with co-existing unsuspected tuberculosis of serous membranes, discovered at autopsy. The second dose of 5 milligrams tuberculin was followed by collapse, and death occurred in 30 hours.

The experiences of the early tuberculin period taught those who continued the remedy in their practice to avoid excessive doses, that were liable to induce severe reactions which were found to be the chief source of danger. That even very small doses could not invariably prevent serious accident is shown by Heron's case⁵ in which the first dose of one-third of a milligram caused death in collapse.

Concerning our preference for the Watery Extract we are supported by the fact that it has not been attended by danger or undesirable temporary reverses in the hands of many physicians who have used it in general practice and make no claim to being specially trained or expert, a fact which we consider most important; since, if specific medication is to bear fruits appreciable in the mortality statistics from tuberculosis of a nation or country, it is hardly necessary to point out that, unless it can be safely and successfully applied by the profession at large, and without special facilities and conditions such as climate and specially equipped institutions, the time is still far off when such a hope will be realized to a degree that the benefit would be apparent by a reduction, falling materially below the natural variation for different periods to be compared. That the time would be near at hand if the results to be tabulated can be attained by every intelligent, painstaking practitioner is equally apparent.

The following tabulation gives the names and place of residence of the physicians who have sent answers to our enquiries, together with the cases treated in the different stages, and the results obtained. A considerable number of others, some of whom have used the remedy for years, were unable to fill out the question blanks mailed to them, they having kept no detailed records, but often gave their general experience which was favorable, with but few exceptions in which only seriously advanced cases had been treated. In other instances the physicians addressed failed to reply, or their reports reached us too late to include them in this tabulation.

RESULTS REPORTED ON 2183 CASES OF PULM. TUBERCULOSIS TREATED BY ADDITION OF WATERY EXTRACT OF TUBERCLE BACILLI TO USUAL METHODS

REPORTED BY		Early Stage					Moderately Advanced Stage					Far Advanced Stage							
NAME	RESIDENCE	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed
Ardrey, L. L.	Bandera, Tex.	17	14	...	1	2	...	33	6	8	9	10	...	28	...	2	6	...	20
Bacon, W. W.	Albany, Ga.	...	...	...	...	...	...	3	1	1	...	1	...	...	...	...	...	...	...
Baird, W. T.	El Paso, Tex.	3	3	...	...	...	...	3	3	...	...	...	...	19	9	...	6	...	4
Berlin, W. C. K.	Denver, Col.	1	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
Bethea, J. J.	Seminary, Miss	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
Boone, J. C.	Wickliffe, Ky.	2	1	...	1	...	...	2	...	2	...	...	...	2	...	...	...	...	2
Bouvier, J. G.	Jeanerette, La.	3	2	1	...	...	...	3	1	1	...	1	...	4	...	...	...	3	1
Briggs, J. R.	Dallas, Tex. ¹⁾	231	231	...	...	...	...	203	144	7	...	3	49	185	48	...	...	14	123
Brown, G. T.	Phillipsburg, O.	3	3	...	...	...	...	4	4	...	...	...	...	5	1	1	...	1	2
Brown, D. B.	Toledo, O.	8	8	...	...	...	...	4	2	...	1	...	1	6	2	...	...	4	...
Bruner, F. M.	Santa Ana, Cal.	20	20	...	...	...	...	2	1	1	...	...	...	3	...	...	1	1	1
Cherry, T. E.	Cowden, Ill.	...	...	...	...	...	...	2	...	...	2	...	...	...	...	...	...	...	...
Cornick, B.	San Angelo, Tex.	4	2	1	1	...	...	13	4	5	2	2	...	33	3	6	13	2	9
Denison, Chas.	Denver, Col. ²⁾	67	28	13	17	8	1	28	9	4	9	5	1	52	5	8	16	14	9
Denny, C. F.	St. Paul, Minn.	5	2	3	...	...	...	...	...	...	...	...	...	3	...	...	...	...	3
Doerr, J. E.	Mt. Vernon, Ind.	...	...	...	...	...	...	1	1	...	...	...	...	2	...	...	...	1	1
Dorrestein, C. A. M.	New Orleans, La.	3	3	...	...	3	...	2	...	...	...	...	2	1	...	1	...	...	...

1). All relapses after discharge are included in the number reported as "Failed."

2). Most of the improved cases were treated but a short time.

RESULTS REPORTED ON 2183 CASES OF PULM. TUBERCULOSIS TREATED BY ADDITION OF WATERY EXTRACT OF TUBERCLE BACILLI TO USUAL METHODS
(Continued)

NAME	RESIDENCE	REPORTED BY						Early Stage						Moderately Advanced Stage						Far Advanced Stage					
		Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed
Durel, W. J.	Covington, La.	10	9		1			10	5		3	2		17	4	3	3			17	4	3	3		4
Dryer, J. L.	Santa Ana, Cal.	6	4			1	1	9	2	2	1	2	2	9		2				9				2	5
Ellison, W. A.	Lockhard, Tex.													1			1			1			1		
Eustice, A.	New Orleans, La.													1						1					
Evans, G. H.	San Francisco, Cal.	4	1	2		1		4		1	1		2	1						1				1	
Finley, F. W.	Jellico, Tenn.	1	1											2						2					
Fisher, E. M.	Roswell, N. M.	3	3											1						1					1
Gardner, M. N.	Greenleaf, Kan.													1						1					1
Gleitsmann, J. W.	New York, N. Y.	4	4											1						1					1
Goldmark, C.	New York, N. Y.							1	1																
Greenwood, F. S.	St. Catharines, Ont.	1	1					1	1					3	1	1				3	1	1			1
Gustetter, A. L.	Nogales, Ariz.	4	1	2	1			1			1			1						1					
Hall, S. B.	Clinton, Tenn.	1	1											2						2					2
Hatcher, J. O.	Imboden, Ark.	1	1					1																	
Hertzler, W. C.	Toledo, O.							1	1					1											
Hetherington, A. J.	New Orleans, La.	1	1																						
Holden, G. W.	Denver, Col.	4	1	2		1		1						4				1		4				3	

1). Owing to moving of office and inaccessibility of records, a large number of additional cases treated cannot be included in this report.
NOTE: Two cases reported by Dr. J. B. Earle, of Greenville, S. C., were accidentally omitted from the tabulation. Failure is recorded in one case in the far advanced stage, and one case in the early stage was apparently cured.

RESULTS REPORTED ON 2183 CASES OF PULM. TUBERCULOSIS TREATED BY ADDITION OF WATERY EXTRACT OF TUBERCLE BACILLI TO USUAL METHODS
(Continued)

REPORTED BY		Early Stage						Moderately Advanced Stage						Far Advanced Stage					
NAME	RESIDENCE	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed
Johnson, L. D.	Whittier, Cal.	...	...	...	...	...	...	1	...	1	...	...	...	2	...	...	...	...	2
Jones, C. C.	Comfort, Tex.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...
Jones, R. P.	Clinton, La.	1	1	...	...	...	...	4	2	1	1	...	...	1	...	...	...	...	1
Jones, W. T.	Fort Davis, Tex.	1	...	1	...	...	...	1	...	...	1	...	...	1	...	...	...	...	1
Kilbourne, J.	St. Francesville, La.	...	...	...	...	...	...	2	2	...	...	...	...	1	...	...	...	...	1
Lee, C. B.	Scarboro, Tenn.	3	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lemon, Cora B.	Grants Pass, Ore.	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lewis, S.	Brooklyn, N. Y.	...	...	...	...	...	...	2	1	1	...	...	...	1	...	1	...	...	...
Lichty, M. J.	Cleveland, O. ¹⁾	1	...	...	1	...	...	...	...	...	...	...	...	6	...	2	2	1	1
Love, J. D.	El Paso, Tex.	...	...	...	...	...	...	3	1	1	...	1	...	5	1	1	...	1	2
Lovell, F. B.	Gibson City, Ill.	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
McCafferty, C. S.	Chillicothe, O.	18	18	...	...	...	...	2	1	...	1	...	...	14	4	...	...	...	10
Macquillan, J. W.	Chattanooga, Tenn. ²⁾	1	...	...	...	1	...	2	...	...	1	1	...
McKowen, E. E.	Jackson, La.	...	...	...	...	...	...	4	4	...	...	...	...	4	2	...	1	...	1
McVea, C.	Baton Rouge, La.	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Maerker, A. E. H.	Napoleon, O.	3	1	2	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...
Marvin, S. B.	Cincinnati, O.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...

1) Period of treatment was short in the case in the early stage and in some of the third stage.

2) Case in second stage is still under treatment.

RESULTS REPORTED ON 2183 CASES OF PULM. TUBERCULOSIS TREATED BY ADDITION OF WATERY EXTRACT OF TUBERCLE BACILLI TO USUAL METHODS
(Continued)

REPORTED BY		Early Stage					Moderately Advanced Stage					Far Advanced Stage							
NAME	RESIDENCE	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed
Robinson, F. N.	Camden, N. J.	3	2	1				1		1				3			3		
Roblee, W. W.	Riverside, Cal.	6	4		2			4		2		2		8				3	5
Rogers, C. G.	Dayton, O.	12	12					6	6					6					6
Russell, J. M.	Monett, Mo.							1			1								
Sawyer, Jas.	Asheville, N. C.	33	33					19	19					5	3	1			1
Saylor, H. L.	Cogswell, N. D.							3	3					4	1		1	1	1
Seay, E. L.	Denison, Tex.	3	3																
Shipley, B. F.	Alpha, Md.	1	1					1	1					3				1	2
Simpson, W. I.	Phoenix, Ariz.	2	1		1														
Sisk, A. O.	Earlington, Ky.							4		1	3								
Smyth & Woodland	Medicine Hat, Alberta ¹⁾	2	1	1				1	1					3		1		2	
Steffen, F.	College Point, N. Y.	2	1		1			1					1	1					1
Stone, Hy. H.	Phoenix, Ariz.	9	7	2				11	7	2	1	1	1	5				2	3
Stubbs, W. P.	Baltimore, Md.							2		1	1			1					1
Suddarth, C. H.	Smithville, Mo.	1	1					1		1									
Sweet, Earl	Los Angeles, Cal.	2			2									2		1		1	
Talmage, E.	Canton, O.																		1

¹⁾ Cases in third stage still under treatment.

RESULTS REPORTED ON 2183 CASES OF PULM. TUBERCULOSIS TREATED BY ADDITION OF WATERY EXTRACT OF TUBERCLE BACILLI TO USUAL METHODS
(Continued)

REPORTED BY		Early Stage						Moderately Advanced Stage						Far Advanced Stage					
NAME	RESIDENCE	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed	Number treated	Apparently Cured	Disease arrested	Greatly Improved	Improved	Failed
Taylor, H. L.	St. Paul, Minn. ¹⁾	47	21	...	12	10	4	79	20	...	21	26	12	45	3	...	2	16	24
Terry, B. F.	Rising Star, Tex.	21	21	...	...	...	...	1	1	...	...	...	...	1	...	...	...	...	1
Thomas, J. M. D.	Baltimore, Md.	3	3	...	...	...	...	...	...	...	...	...	...	3	...	...	1	1	1
Turman, I. L.	Cynthiana, Ind.	3	3	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	2
Tweedie, H. V.	Baltimore, Md.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...
Tyndale, J. H.	Lincoln, Neb. ²⁾	11	11	...	...	...	...	30	26	4	...	...	...	2	2	...	...	...	...
Underwood, J. M.	LaFayette, Ga.	...	...	...	...	...	...	2	...	...	2	...	...	1	...	1	...	...	...
Vosburg, W. H.	Dunkirk, N. Y.	2	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wall, W. D.	Zachary, La.	1	1	...	...	...	...	1	...	1	...	...	...	1	...	...	...	...	1
Walker & Welborn	Evansville, Ind.	...	...	...	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...
Williams, John Hey.	Asheville, N. C. ¹⁾	63	57	4	...	2	...	73	31	18	...	8	16	34	...	...	1	5	28
Williams, J. R.	Greensboro, N. C. ¹⁾	20	19	...	1	...	...	21	10	6	5	...	...	23	2	2	6	6	7
Williams, J. W.	Springfield, Mo.	...	...	...	...	...	...	1	1	...	...	...	...	1	...	1	...	...	...
Wolf, J.	Allegheny, Pa.	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Woodcock, J. H.	Muskogee, I. T.	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
Yates, J. A.	Marfa, Tex.	...	...	...	...	...	...	2	...	1	...	1	...	...	...	...	...	...	...
Totals		748	625	43	49	25	6	689	363	91	71	59	105	746	110	93	113	95	335
Per Cent.		83.5	5.9	6.5	3.3	0.8		52.7	13.2	10.3	8.6	15.2		14	8	12.5	15.1	12.7	44

¹⁾ Improved cases treated only a short time. Relapses, after discharge, are included in cases reported as "Failed."

²⁾ Used cinnamic acid in open stage cases, prior to administration of Watery Extract of Tubercle Bacilli.

Of the total number of cases reported to us, 921 were treated in hospitals and institutions in combination with the usual hygienic and dietetic methods. If these are considered apart from the rest, the results in apparent cures exceed those obtained in private practice by 19 per cent. in the early, by 23.5 per cent. in the middle, and by 7.3 per cent. in the advanced stages.

It was impossible to take also into consideration the length of time the cases were treated, without unduly enlarging the space we wish to occupy. As in our own clinical material, many of the improved cases did not complete their treatment, for one reason or another, oftenest, however, because they saw no further necessity, or were unwilling or unable to make necessary sacrifices for its completion to a degree that justified their inclusion in the apparently cured class, and which in cases of cavity, may require many additional months, when, although the general condition is good, a little cough with bacillary sputum still exists.

The enquiry in addition to the results obtained included requests of opinions and experiences concerning methods of administration, size and frequency of doses, selection of cases, influence on symptoms and on tuberculous complications, danger, estimates of value, comparative value with other preparations, relapses and permanency of results.

Administration: Nothing materially differing from the mode of application which is advised in the printed directions has been added to a better understanding or improvement in the method. Of interest in this respect we may, however, mention Dr. Boyd Cornick's experience, who was one of the first to use the remedy and who finds the doses advised by us too large, he beginning with one-fifth of the recommended initial dose. Dr. S. B. Prouty reports in one of his cases extreme sensitiveness to the remedy in its early administration; any advance from the initial dose of one-tenth c. c. of the No. 1 solution caused his patient to have a dull feeling in the head and to feel generally ill, although no rise in temperature occurred. These minute doses had to be continued for a long time until an increase was possible. This patient recovered.

The selection of cases is dwelt upon in many of the replies, and the best results having been obtained in the early and middle stages, many wished the remedy limited to these stages. Others wish to exclude instances of mixed infection which is only another way of saying to exclude seriously advanced cases; while still others would wish its benefits refused to none, except such, as are evidently hopelessly advanced in their disease.

Dr. Rogers believes that young subjects are especially favorable for its use, an opinion which is likewise shared by Dr. Dryer. In instances of complicating pregnancy, Dr. Sisk believes the remedy is particularly indicated, basing his opinion upon his favorable experience in two cases.

Influence on symptoms, of a favorable character, such as fever, cough, expectoration and night sweats is mentioned by nearly all observers who answered the questions. In a few instances temperature rises are said to have been observed from a too rapid increase of doses. In several of the reports an influence on symptoms is not acknowledged and their amelioration and final cessation in the cases reported is attributed to other causes, such as rest, diet and general management or symptomatic treatment. Our own experience leads us to agree with this view, in so far as these measures have undoubtedly a favorable influence on the symptoms mentioned, but we also hold that in many cases the favorable effect of the remedy is unmistakable, although its action is, as a rule, indirect upon the local disease itself, and therefore slower to appear, but it is more enduring and permanent. The same applies to favorable changes observed in the general nutrition as manifest by gain in weight and strength, better color, etc., and in this view concur the majority of the answers received.

Safety: In not one single instance were there expressions other than of the absolute safety of the remedy as already stated above.

Value: As to its value there is likewise a practically unanimous consent. While some observers see its greatest value in the induction of immunity or increase of resistance, and on that account in the permanency of the results, others dwell more particularly upon the disappearance of physical signs, while still others attach importance to both, as well as to the influence on symptoms. A few physicians with very limited, although favorable experience, desired further time for observation.

Dr. Ardrey in his answer to the question stated that a number of cases which had failed to improve under other methods showed improvement and eventually recovered on resorting to the Watery Extract of Tubercle Bacilli.

Dr. Cornick speaks of its great value, though he points out quite properly that other helpful measures should not be neglected, and that the remedy could be discredited only by those who expect the impossible to happen.

Drs. Pottenger and Browning find it absolutely safe and of undoubted value in nearly every case in which there is any hope at all, even in the far advanced third stage.

Compared with their experience with tuberculin, all that have used both preparations mention the greater safety and acknowledge the greater value of the Watery Extract.

Dr. H. L. Taylor, of St. Paul, states that of all the different tuberculin preparations which he has used he regards the Watery Extract the safest and the best.

Dr. Denison, who has used every tuberculin preparation as well as antitubercle serum, considers the Extract the safest and most reliable, and as compared in value, he says the Extract stands supreme.

Dr. W. T. Baird finds the value of the preparation of the greatest, and its use absolutely safe; having formerly used tuberculin, antitubercle serum and nuclein, the Extract is the only one which has given him satisfactory results.

Dr. Cornick has also used tuberculin and antitubercle serum, but greatly prefers the Extract on account of its safety and the better results he obtains.

The same statement is made by Drs. Saylor, Bacon, Bruner, Roblee, Stone, Sawyer, J. H. Williams and others, concerning the comparative value of tuberculin, and by Drs. Powers, Robinson, Bouvier, Prouty, and Marshburn, concerning Marmorek's and other antitubercle sera.

Dr. Briggs attests the safety and value of the Watery Extract as having no equal in other specific remedies in either respect. Tuberculin he considers dangerous and uncertain in its action, and the result not enduring. His experience with antitubercle sera has been disappointing.

Physical Signs: Many of the reports refer to the local changes observed in the lungs under the use of the remedy, especially in the earlier stages in which the physical signs are stated to have been favorably influenced, often to a degree of entire disappearance. Detailed favorable observations are contained in the reports of Drs. Ardrey, Baird, Briggs, Bouvier, Brown (Phillipsburg, O.), Denison, Cornick, McCafferty, Pottenger and Browning, John Hey Williams, J. Roy Williams, Taylor, Tyndale, Sawyer, Stone, while others who make no special mention attest the favorable influence by the reported recovery of patients.

Permanency: In all reports dealing with cases treated and discharged several years ago, the question as to permanency is answered. In this respect there is a most remarkable uniformity, and as this is the most important feature of the results, since it is not a question of interpretation and classification as to what constitutes an apparent cure, arrestment, etc., it testifies to the value of specific treatment more than do results noted immediately on the patient's discharge.

No relapses whatever in cases successfully treated and discharged are reported by Drs. Bacon, Baird, Boone, Brown (Phillipsburg, O.), Cornick, Doerr, Durel, Dryer, Earle, Eustice, Finley, Fisher, Gleitsmann, Greenwood, Jones, Kilbourne, Lewis, Mayfield, McKowen, Morris, McCafferty, Newton, Popp, Rogers, Roblee, Seay, Steffen, Shipley, Stubbs, Stone, Sawyer, Terry, Williams (Springfield, Mo.).

Dr. Denison states concerning permanency that this feature is the most remarkable, some of the cases having been discharged up to 9 years ago. Dr. Durel believes that this feature is the chief object of using the remedy.

Dr. Briggs has seen relapses in six to seven per cent. of his discharged cases, in many of which he states the discharge to have been premature, and at the request of the patient. Drs. Pottenger and Browning have had no relapse in a single instance in which the patient was treated long enough to justify dismissal as apparently cured. Dr. Tyndale has had no relapse in any case as far as he has been able to keep informed. Dr. Terry has not only seen no relapses, but the patients after discharge have continued to improve in general health and vigor. Dr. J. H. Williams finds permanency in 87 per cent. of his discharged cases, not all of which had attained a clinical cure on discharge.

Dr. Greenwood, of St. Catharines, Canada, reports no relapses in his cases and mentions one in particular treated in a far advanced stage after having been sent home growing worse, and hopelessly advanced from one of the Canadian sanatoria. The case was complicated by tuberculous laryngitis with aphonia; her weight had been reduced to 80 pounds. The case was successfully treated with the Extract, including the laryngeal affection, the voice was restored and weight increased to 145 pounds. The patient has since married, has borne 2 children and is still in perfect health.

Dr. J. M. Boyd, of Knoxville, Tenn., was unable to supply detailed statistics of his cases. He has treated probably 100 cases during the last seven years and found the remedy perfectly safe, having never seen any untoward effect. He is entirely satisfied with his results and convinced of its great value in the treatment of tuberculosis. His cases discharged as apparently cured have remained so, without relapse, in perfect health.

Tuberculous Complications.

Bones and Joints: Dr. Briggs reports on six cases of bone and joint tuberculosis successfully treated with Watery Extract of Tubercle Bacilli, and without relapse.

Dr. Eustice reports on a case of spondylitis with chronic suppurating sinus, advanced and progressive phthisis of long standing. Both affections were successfully treated with Extract during the course of one year. Discharged two years ago, at the time of his report there has been no relapse.

Dr. J. Hey Williams' cases include two with complicating Potts' disease, both of which were cured.

Dr. Robinson reports one case of phthisis with Potts' disease, the latter condition having previously been treated mechanically without relief. The patient was practically cured with the Extract, the pain disappeared, the patient can walk without support and is able to do her house work.

Dr. Denison reports a case of co-existing tuberculous necrosis of the

tibia, with recovery of both the lung and bone affection under the use of the Extract.

Dr. Cherry records a case of bone and joint tuberculosis in the second stage of phthisis; both conditions were greatly improved, when the treatment was stopped. The patient has not relapsed so far.

Dr. Maerker: a case of co-existing tuberculosis of the ankle joint; both the lung and joint affection were cured, the favorable changes in the bone being demonstrable by X-ray. The result is now enduring for two years.

Drs. Pottenger and Browning: a case of tuberculous knee joint in which they believe the remedy aided recovery.

Dr. McCafferty mentions a case of tuberculous arthritis which was greatly improved.

Dr. Cornick obtained but slight benefit in instances of advanced bone and joint affections and better results in synovitis. Dr. Bruner saw only temporary improvement in one case treated. Dr. Baird failed in his case of tuberculosis of the knee joint.

Digestive Organs: Tuberculous Diarrhoea: A case complicating phthisis is reported by Dr. Suddarth as having been cured. One case each was reported cured by Dr. Sisk, Dr. Brown (Phillipsburg, Ohio), Dr. Cherry, Drs. Pottenger and Browning, and by Dr. Cornick. Two cases cured are reported by Dr. Denison; improvement is reported by Dr. Briggs and by Drs. Pottenger and Browning.

In other instances than the case mentioned by Dr. Cornick which recovered unaided by other remedies, a marked influence was not apparent. Dr. Baird saw no influence at all; Dr. Bouvier failed in 3 cases; Dr. Steffen in 2 cases, which all were far advanced in phthisis; and in this stage the remedy also failed in Dr. J. H. Williams' hands.

Rectal fistula: A case with tubercle bacilli demonstrated in the discharge was treated by Dr. Prouty with complete healing under the use of Extract, a result which he considers most remarkable.

Mouth, Oro-pharynx and Nose: Dr. Cornick has succeeded in effecting a cure in some instances of this kind by a combination of the Extract with other suitable local treatment. Drs. Pottenger and Browning in like cases have also found the remedy helpful at times while in other instances everything failed. Dr. Durel thinks that in a case of tuberculosis of the tongue he obtained benefit from the Watery Extract.

Genitalia: Tuberculosis of the genital organs is mentioned in only three of the reports. Dr. Cornick failed in a case of tuberculosis of the uterus, while Dr. Brown (Phillipsburg, Ohio), cured his case of ulceration with the Extract, removing a co-existing tuberculous polypus surgically. Dr. Denison speaks in his report of several cases of tuberculous orchitis which were either cured or greatly improved. Dr. J. H. Wil-

liams mentions a case of tuberculous testicle in which the Extract failed and castration was resorted to.

Glands: Dr. Cornick reports subsidence and disappearance of enlarged tuberculous lymph glands, and favorable experiences are reported by Drs. Ardrey, Briggs, Brown (Toledo, Ohio), Brown (Phillipsburg, Ohio), Denison, Durel, McCafferty, Newton, Rogers, Shipley and J. Hey Williams. Dr. Bruner saw no influence upon the tuberculous glands of far advanced phthisis. In the other reports no mention was found of tuberculous glands.

Larynx: Tuberculosis of the larynx was reported upon by the following observers, no mention being made in the report of others.

Dr. Denison found that ulcers heal and infiltrations grow less under the use of the Extract. Dr. Holden saw improvement in all of his five cases. Dr. Baird cured tuberculous laryngitis in two early-stage cases. Dr. Brown (Toledo) saw improvement in all of his cases, and Dr. Brown (Phillipsburg, O.) found that the larynx complications yielded and disappeared. Dr. Briggs' report corresponds with that of Dr. Denison; Dr. Rogers claimed good results; Dr. McCafferty cured one case and improved another, of the only two cases observed; Dr. Wall treated only one case and cured it; Dr. Marshburn also treated one aphonic case successfully, with restoration of the voice; one case each was treated and cured by Drs. Evans, Saylor and Stubbs; Dr. Seay states his results as favorable; Dr. Cornick observed healing of tuberculous ulceration in a number of cases; Drs. J. R. Williams and Durel report improvement. Drs. McCafferty, Baird, Ardrey, Berlin, Bruner and Roblee failed in advanced otherwise progressive cases of phthisis.

Dr. John Hey Williams obtained excellent results in the great majority of his cases, and speaks of the pleasure it gave him to witness the improvement from day to day. Drs. Pottenger and Browning found the remedy of the greatest value in laryngeal tuberculosis, and believe that in some cases it is the only hope for the patient.

Nose: A case of tuberculous ulceration of the nasal septum healed under the use of the remedy in Dr. J. Roy Williams' hands.

Ear: Two cases of tuberculous otitis mentioned in the report of Dr. J. Hey Williams were both cured with the Extract.

Peritonitis: In two cases with extensive complications Dr. Cornick failed; Dr. Briggs and Dr. Sawyer each treated one case successfully.

Skin: Influences on skin tuberculosis are mentioned in three reports; a case of lupus treated by Dr. Denison yielded but obstinately to the remedy, but a favorable influence was unmistakable. Dr. J. Roy Williams cured a case of lupus. Dr. Cornick saw improvement in a case of tuberculous ulceration.

Urinary Organs: Tuberculosis of the kidney or bladder is mentioned in three reports. Dr. Denison reports a case of tuberculous abscess of the kidney, the urine containing tubercle bacilli, which was apparently cured 5 years ago with the Extract, but a relapse occurred two years after discharge. The patient was again treated with the Extract and was again apparently cured, without relapse thus far. Dr. Tyndale reports on two cases of tuberculosis of the kidney and bladder in which he considers the attained improvement to amount to arrest of the disease (apparently still under treatment).

Considering the difference in material, classification of stages and interpretation of results which must naturally vary in the cases reported by a hundred or more different physicians, we find them to practically correspond with our own which we have reported in the 10 years past, and that they fully support all that we have claimed for the safety and value of the Watery Extract which has been employed in the material here brought together. While the reports from other observers concerning permanency do not admit of tabulation, as far as we can judge they approach or even exceed what we have shown.

That institution treatment has, on the whole, given better results should be expected. The difference is, however, not great enough to discourage the general practitioner who cannot give this additional advantage to his patient, and the great majority of cases of phthisis must necessarily be treated without it, for reasons that need no special mention. The degree of success which has attended the work of those whose personal reports they have permitted us to publish is unprecedented in general practice, and the difference in favor of the work done with the Extract, in comparison with statistics of results from treatment in which specific remedies were not employed, is so apparent that such a comparison is superfluous; and we feel justified in the opinion that the general practitioner is in a position to contribute an important share in the fight against tuberculosis, which will make itself felt to an appreciable degree, when a large number will add specific methods to their other resources.

Opponents to specific remedies for the treatment of tuberculosis will no doubt point out that the evidence offered in their favor is entirely clinical, and the absolute proof of the value of any one of them is therefore still outstanding; the more so as experimental treatment of guinea pigs and rabbits was not successful in the hands of a majority of those who studied the value of tuberculin and sera upon such animals. They will likewise assert that the experimental induction of true immunity against tuberculosis in lower animals has given equally contradictory results, the failures being more numerous than the successes; all of which is true. To those who are prejudiced to a degree that they cannot consider the subject except from a pessimistic attitude at all times, a reply would be super-

fluorous and they must be permitted to indulge themselves in their favorite occupation of opposing progress and advance. To others willing to examine all evidence and consider even that kind which is circumstantial, there is plenty of material for reflection even in the present report. For them it may appear reasonable to point out, that a series of cases in all stages and with all sorts of tuberculous complications which, including our own, amounts to between 3,000 and 4,000, has a much greater significance, than may be attached to experimental studies in lower animals; and they will appreciate the fact that failure or success in animal experiments does not necessarily negate or confirm clinical evidence, the less so when the clinical work has been extended over a period of ten years by a number of independent observers.

Animal experiments, to prove anything positively, cannot be made upon such which can recover spontaneously; such experiments must be confined to those which invariably die after a virulent infection, like the guinea pig. To protect or cure them is necessarily difficult and the influences which aid in success, or prevent it, are not always readily determined. Differences in the animals, in age, in the mode of infection, the number of tubercle bacilli used, the time, frequency and size of dose administered, their feeding, and general care, and incidental laboratory as well as natural diseases (often but little understood, and not necessarily in plain evidence even upon autopsy) have undoubtedly contributed to failures in not a few instances.

The successful protection or cure of guinea pigs with specific products has, however, been accomplished and though such instances are not as frequent as are failures, a single demonstrated positive result would be better evidence than many negative ones when the experiment animal is so highly susceptible that spontaneous recoveries are unknown.

We have, ourselves, obtained both protections and cures in guinea pigs with the remedy used in the treatment of our cases; they are few when compared with the failures, but were they more numerous in our hands and those of others they could serve no other purpose than to be suggestive of like results to follow in man; but this would still have to be demonstrated by clinical observation.

Deaths from other causes of supposedly cured patients occur; several such were reported to us in patients discharged years ago, but unfortunately without autopsy results as concerned the question of recovery from their tuberculous lung affection. Accident brought such a case under our observation a year ago. The patient, a young man aged 19, was dismissed from our institution apparently cured in 1904, a result which was further confirmed later by the negative effect of a tuberculin test of three injections of 5—10 and 20 milligrams, respectively. On his admission he had presented evidence of tuberculous disease in both upper

lobes with a cavity on one side and softening on the other. He likewise had an oesophageal fistula in the neck, in the discharge of which tubercle bacilli were demonstrated, and tubercle bacilli were likewise found later in the faeces when our attention was directed to persistent mushy stools.

While on a commercial trip he was taken ill with influenza, and being but a short distance from Asheville, came to us for advice on Feb. 19, 1906. We made a diagnosis of influenza by microscopical demonstration of influenza bacilli in great number in his sputum; and of co-existing pneumonia from the symptoms and the physical signs in the left upper lobe anteriorly and the upper part of the lower lobe posteriorly. In addition, there was a generalized bronchitis. During his illness his sputum was examined with great frequency and care until he died. We found influenza bacilli and later also streptococci in great number; tubercle bacilli were never found. All therapeutic efforts failed, the pneumonic consolidation extended in all directions with later development of abscess which eventually was opened surgically, and drained. Death occurred from sepsis and exhaustion on April 29th.

Autopsy revealed a healed cavity in the right upper lobe surrounded by indurated tissue in what otherwise appeared to be normal lung. In the left upper lobe was a large pneumonic abscess with necrotic walls involving practically the whole lobe. Of the cavity diagnosed before in the left upper lobe, portions of its walls were still recognizable, although the surrounding structures were included in the abscess. The pericardium contained a small amount of clear exudate. The bronchial and mediastinal glands were not enlarged. Only the chest was permitted to be opened.

Specimens were taken from various portions of the lungs, including, of course, the walls and periphery of the healed cavity of the right side and of what remained of the wall of the cavity of the left side together with portions of the walls of the abscess.

Careful histologic examinations of numerous serial sections of the removed tissues from the various portions of both lungs revealed neither a single tubercle bacillus nor the slightest evidence of tubercle. The specimens of the cavity walls from both sides showed connective and fibrous tissue. The old cavity wall of the left side had resisted destruction, but was infiltrated with round cells. In tissues from other portions of the lungs nothing resembling tubercle or caseation was seen.

This case is the only one we can offer as a cure, actually demonstrated by autopsy, of pulmonary tuberculosis under the use of Watery Extract of Tubercle Bacilli.

EXAMINATION OF BLOOD FOR ALKALINITY, AGGLUTININS AND OPSONINS.

For several years past we have endeavored to study the development and increase of specific agglutinins and more recently we have included

the study of opsonins and their variations in the blood of cases, before, during and after their treatment with Watery Extract of Tubercle Bacilli; while during this last year blood alkalinity was also made an object of observation. Concerning opsonins we are not as yet ready to express an opinion; and we are still endeavoring to so improve our methods and technique as to enable us to avoid material variations in the results from the same blood specimen taken at the same time, or on the same day, with countings by the same and by different observers. The results noted thus far show too great a divergence to justify us in believing that we are working reliably enough to preserve us from wrong conclusions.

Blood alkalinity: Blood alkalinity we determined by Dare's spectroscopic method in 100 cases on admission, and in 100 of apparently cured or arrested cases on discharge. In addition the alkalinity was determined in four cases which pursued an unfavorable course and died. In the latter the alkalinity steadily declined until death.

According to Dare's table of equivalents in which 266 milligrams of NaOH are normal for 100 cubic centimeters of blood, the values for our cases on admission and discharge may be seen from the following table, and the number of cases being 100, all figures at the same time express the corresponding per cent.

Blood Alkalinity of 100 Cases of Phthisis on Admission.

Dare's Scale.	Eq'lent. NaOH, mgr.	Total Cases.	1st Stage.	2nd Stage.	3rd Stage.
0.90	239	2	0	2	0
0.95	252	6	2	0	4
1.00	266	20	3	5	12
1.05	279	20	2	6	12
1.10	292	36	14	17	5
1.15	306	9	3	2	4
1.20	319	6	6	0	0
1.25	332	1	0	0	1
Totals		100	30	32	38

Blood Alkalinity of 100 Cases of Phthisis Apparently Cured, or Disease Arrested on Discharge.

Dare's Scale.	Eq'lent. NaOH, mgr.	Total Cases.	1st Stage.	2nd Stage.	3rd Stage.
1.00	266	5	0	0	5
1.05	279	0	0	0	0
1.10	292	26	5	13	8
1.15	306	15	3	6	6
1.20	319	20	6	6	8
1.25	332	17	3	10	4
1.30	345	14	5	3	6
1.35 & over	359	3	1	2	0
Totals		100	23	40	37

The foregoing table shows a general increase in blood alkalinity of the 100 patients who were treated successfully.

In the 100 cases in which it was determined on admission, it was below the normal in 8, normal in 20, and above normal in 72 cases, the entire number averaging 9.15 per cent. above normal, only one case reaching 25 per cent.

In the treated cases it was below normal in none, normal in 5 and above normal in 95, with an average above normal of 19.35 per cent.; 34 cases had reached 25 per cent. and half of them exceeded this amount.

The average gain of 10 per cent. in the blood alkalinity in treated cases is about equally distributed in the different stages of the disease.

For the interpretation of the observed increase of blood alkalinity in our cases, we have some experimental data and clinical observation to guide us in a general way. Since von Behring published his observations of the relation of blood alkalinity to the resistance to anthrax infection in 1888 a considerable literature has developed on this interesting subject. To review this literature in detail would lead us too far. Here we can only say that among the authors who have contributed to it, there appears no material difference in the opinion that in infections which follow an unfavorable course, the blood alkalinity falls steadily until death; whereas, when the infection is overcome, the primarily depressed curve of blood alkalinity takes an upward tendency and reaches frequently a higher degree than observed before the infection occurred. A material increase in the blood alkalinity in an infectious disease is considered by all as an indication that the organism is overcoming the infection, or has recovered from it, while a steady fall indicates the reverse.

Rumpf⁶ found in his 14 cases, most of which were phthisis, that the blood alkalinity was not materially altered as long as their general condition remained good. With the advent of cachexia the alkalinity decreased.

The relation of its increase to the course of the infection is also shown by Strauss.⁷ Recovery occurred in two cases of pneumonia, one of typhoid fever and one of erysipelas, in which the alkalinity was markedly above the normal; five cases of typhoid and one of pneumonia showed no increase, and death occurred in every case.

A depression of the alkalinity occurs also when bacterial toxins are introduced, and the fall continues when the dose is large enough to prove fatal; a rise follows the depression if the dose is smaller and is recovered from. An adequate dose of a specific antitoxin, as for instance, in diphtheria toxin poisoning, arrests the downward course, and promptly increases the blood alkalinity and the animals recover (Cantani; Rigler).

Fodor and Rigler,⁸ and Emmerich and Loew⁹ have asserted a close relation between blood alkalinity and immunity. The former have shown in their investigations that the observed increase is not due to an increase of alkaline salts in the blood, and hold that when specific toxins are injected, the subsequent increase depends upon a vital reaction on the part of the leucocytes which are specifically stimulated to the formation of an alkaline organic substance; Emmerich and Loew support this view and according to these authors an increase of alkalinity in immunity is due to this new-formed organic alkaline substance or combination.

If we apply these and other observations to the cases we have examined our results would seem to confirm them in so far, as in the cases in which the alkalinity became materially increased the course was favorable, while in the four fatal cases mentioned the alkalinity fell steadily until death.

The relation of the observed increase, to the use of specific toxins with a view of inducing immunity, can only be determined positively in our cases from a clinical standpoint, by further observations and study. Karfunkel¹⁰ found that when he administered tubercle bacilli emulsion in slowly increasing doses, there was an increase of blood alkalinity observable two hours after the dose was administered; the rise continued for six hours, but after twenty-four hours the increase had again subsided. In the end he could not show that there had been an increase as compared with the per cent. present when the treatment was begun.

Although we incline to the opinion that the increase observed by us stood in relation to the specific treatment, we lack a corresponding number of cases not so treated, for comparison, which we trust other observers who do not use specific remedies will supply. When such comparative observations are at hand it will be possible to show whether they did reach a similar degree of increase, as uniformly and in the same period of time as did the cases treated by us, and by that time we expect to have studied the subject further and to have acquired a larger material for comparison. For the present we cannot but be gratified with our observations, even though the resistance which the increase implies were only general, and without a direct relation to the specific treatment employed.

Agglutinins: In respect to the formation of specific agglutinins under the use of specific toxins we can offer more positive data, and here there is not such a lack of observations by others, of values in cases that have not been subjected to the use of specific remedies.

The observation of their increase under all methods of immunization is almost uniform.

Northeimer¹¹ in his dissertation prepared under the direction of Prof. Tafel noted a marked increase of agglutinins in animals treated with

filtrates of cultures of tubercle bacilli and with Tuberculin R, and points out the importance of such tuberculin preparations in the production of immunity against tuberculosis.

Prof. Koch¹² reports his observations on the increase of agglutinins in 74 cases of tuberculosis treated with tubercle bacilli emulsions, and points out the importance of their increase as an evidence of induced immunity. While his observed increase was moderate, only 19 cases or 24 per cent. having given the reaction in a dilution of 1 to 100 and over, at the completion of treatment, Bandelier¹³ in his 37 cases treated with the same preparation, shows 27 cases or 73 per cent. to have reached that degree; in 3 cases he obtained agglutination in dilutions of 1 to 1000. This author attaches likewise great importance to the increase, finding that the more favorable the prospect for a cure becomes, the more marked is the increase of agglutinins and the better it is maintained.

The relation of agglutinins to immunity was considered absolute by Gruber¹⁴; according to his conceptions at the time of his first communications, immunity does not occur without the phenomenon of agglutination.

Widal,¹⁵ who studied it in typhoid, found the relation not as absolute, because serum of typhoid patients had protective properties, though no agglutinins could be shown. At the 12th Int. Med. Congress in 1899, he denied the importance of the reaction as a phenomenon of immunization. Petermann¹⁶ in the discussion agreed with Courmont and Charrin, that the reaction is indicative of defense of the organism against bacterial invasion. Koroltschuk,¹⁷ likewise concurred in this view; he considers the degree of the reaction as a measure of the immunizing property of the serum in which it is observed.

Emmerich and Loew¹⁸ conclude that agglutination is a phenomenon attending the first stage of action of bacteriolytic enzymes contained in the serum.

Castellani¹⁹ found that agglutinins behave like immune bodies to chemical and physical tests, and that although no parallelism exists between their respective development, the serum shows agglutinins and other immune bodies at nearly the same time.

Eisenberg and Volk²⁰ showed that, as a rule, the absolute amount of agglutinins which bacteria can remove from an agglutinating serum depends upon the amount of immunity-units present, while Metschnikoff on the other hand found no necessary relation, but believed that phagocytes are aided in their bacteriolytic action by the agglutination of the bacteria.

Goldberg²¹ considers the phenomenon of agglutination an early sign of successful self-protection of the organism.

Baldwin²² concludes that although agglutination is not a necessary phenomenon of immunity, in tuberculosis it may indicate resistance.

Laubheimer,²³ who studied the subject in typhoid and paratyphoid, found agglutinins present in the serum for their respective bacteria. In 8 of his 11 cases there was likewise unmistakable evidence of its bactericidal properties. In one case in which there was no agglutination the bactericidal action also was wanting.

Neufeld²⁴ closes an account of his study of the subject concerning the relation of agglutination to immunity by stating that agglutinins, like other immune substances, are a reaction product of the blood against the bacteria which they agglutinate; that they and other immune substances develop in most instances about the same time; and Bandelier, in his studies of agglutination in tuberculosis, considers their development and increase under specific treatment as an evidence of the production of specific processes, and of resulting substances which act specifically upon the protoplasm of tubercle bacilli.

Our observations of the agglutination phenomenon in 200 cases of phthisis on admission were as follows:—

The test was negative					in	20 cases
Agglutination occurred in dilutions 1:5					"	45 "
"	"	"	"	1:10	"	62 "
"	"	"	"	1:15	"	11 "
"	"	"	"	1:20	"	30 "
"	"	"	"	1:25	"	24 "
"	"	"	"	1:30	"	5 "
"	"	"	"	1:40	"	2 "
"	"	"	"	1:50	"	1 "

In a like number of cases on discharge the results were as follows:

In 12 cases, a decline had been observed in 8, and a total loss in 4; all the 12 cases grew worse or died.

In 188 cases an increase of agglutinating power was observed under treatment with Watery Extract of Tubercle Bacilli.

The serum of 27 agglutinated in dilutions over 25 and not exceeding 100. Of these were apparently cured 1, or 3.7 per cent.; the disease was arrested in 9, or 33.3 per cent.; improved in 10, or 37 per cent.; stationary in 5, or 18.5 per cent. and grew worse in 2, or 7.4 per cent.

The serum of 65 agglutinated in dilutions over 100 and not exceeding 200. Of these were apparently cured 26, or 40 per cent.; the disease was arrested in 33, or 50.8 per cent.; improved in 5, or 7.7 per cent.; stationary in 1, or 1.5 per cent.; none had grown worse.

The serum of 68 agglutinated in dilutions of over 200 and not exceeding 300. Of these were apparently cured 58, or 82.5 per cent. The disease was arrested in 10, or 17.5 per cent.

The serum of 28 patients agglutinated in dilutions of 300 to 500 and of these were apparently cured 25, or 85.7 per cent., and the disease was arrested in 3, or 14.3 per cent.

Prognostic inferences concerning agglutination on admission appear to us justifiable only in the advanced stages, and in such in which without the test an unfavorable prognosis would naturally be given.

A steady decrease in, or loss of agglutinating power occurred invariably in all cases which were growing worse.

Of 14 cases following an adverse course the tests on admission were negative in 2 cases, not exceeding dilution of 1:10 in 8 cases, 1:15 in 7 cases, 1:20 in 3 cases, 1:25 in 1 case.

As to the indication of a progressive increase under specific treatment the figures above show, that the greater the increase is, the better the co-existing result, and that an agglutinating power in dilutions of over 200 is most desirable to accomplish.

Arloing and Courmont²⁵ found the phenomenon absent in far advanced and otherwise very grave cases of phthisis while in curable cases a positive reaction was the rule.

Bendix²⁶ also found that when the disease rapidly advances the previously present agglutinating power is lost, and Bandelier noted a like relation.

Kinghorn²⁷ found the reaction most frequent in the most favorable cases; in the far advanced stage the test was positive in only one case out of five.

Ravenel and Landis,²⁸ in their study of the subject upon 59 patients of the Phipp's Institute, found that the more advanced the disease was, the lower was the agglutinating power observed. A low power in advanced cases they hold to have an unfavorable prognostic significance. A greater degree of agglutination they found in the more favorable material of the White Haven Sanatorium of which but two out of nineteen cases had advanced beyond the early stage. These cases had been treated in the Institution by ordinary methods for from four months to one year. The result of the test is given in 18 cases as follows:

Agglutination in dilutions 1:10	in	1 case.
" " " 1:15	"	1 "
" " " 1:20	"	6 cases.
" " " 1:25	"	9 "
" " " 1:30	"	1 case.

A greater increase in specific agglutinins under methods of treatment which do not also include specific products of the tubercle bacillus, than that shown by Ravenel and Landis for cases treated at the White Haven Sanatorium for from 4 months to a year, is rarely observed. In only 8 of our cases was the reaction positive above dilutions of 1:30 on their admission and in no case was the reaction positive in dilutions greater than one part of serum to fifty parts of the test fluid.

A contrary result from all other observers is reported by Jessen²⁹ in his recent publication on agglutination in pulmonary tuberculosis.

This author has found in 74 per cent. of 86 cases examined, a positive reaction of 1 part of serum to 100 of test fluid and over, after a residence of one or more months at Davos, Switzerland, without specific medication. Ten of his patients showed such values on arrival or within a week thereafter, while serum of 10 others agglutinated tubercle bacilli in dilutions of 50 and 75 at this time.

This increase the author is inclined to attribute to the influence of the altitude of Davos. Tuberculin, contrary to Spengler, who also made his observations at this resort, had no influence.

We mention this because we would not ignore any claim contrary to our conclusions and those of all other observers, but we do not deem it necessary to more than state here that after reading the article in the original we find that the author's method of applying the test deprives his work of any serious consideration; and that we believe when he will prepare his test fluid as all others have found it necessary to do, so as to prevent spontaneous agglutination of tubercle bacilli, and will accept no result as positive unless the test fluid has cleared, and when he will make his observations upon the same patient more frequently than he appears to have done, then he will obtain results which will not materially differ from the results of those who are experienced in applying the test.

The fact that the reaction is frequently absent in the early beginning of the disease, that it is rarely missed when the disease is more developed, and is again lost toward the end, shows that agglutinins form in the course of tuberculosis as in other infectious diseases in response to specific toxins absorbed into the blood; and that in either case they are an indication of an immunizing process.

In tuberculosis, however, but small quantities of specific toxins are liberated and absorbed and hence the necessary vital reactions, for the degree of which the agglutinins may serve as an indication, do not occur. Therefore but a slight degree of immunity or specific resistance is developed. That even the small amount ordinarily noted is considered of prognostic import is a support for our contention that specific medication is of great value; when we can show that by its aid we can increase it at will, in all but hopelessly advanced cases, and that in those instances in which the agglutinating power of the serum has reached a relatively high degree the percentage of cures and arrestment of the disease is the greatest.

When we shall have studied the subject of opsonins still further, we hope to show a like relation concerning their increase, which Wright and others have found in response to specific remedies. By ignoring

certain contradictory results observed, which we so far cannot explain, and which lead us to suspect our skill in technique, we could easily select numerous instances from the cases studied in confirmation of Wright's claims, and in our own support.

To the student, these laboratory studies are naturally attractive and of great interest and they have been so to us. We are, however, not unmindful that no matter how much laboratory evidence may be offered, in the end practical results must form the basis for the estimation of the true merit of all therapeutic procedures. If these results are as desired, it matters little, whether we attach the greater value to the increase of one immune substance or the other, or whether we consider blood alkalinity, agglutinins or opsonins to be the deciding factor that should govern us in our laboratory observations and interpretations.

There can be no contradictions to the propositions:

1. That the object of all methods of treatment in tuberculosis is the increase of the patient's resistance.
2. That resistance may be general and natural, and that it may also be specific.

This being conceded, we know that the methods of treatment which have aimed at the increase of general resistance only, have not given results as satisfactory as we could reasonably wish them to be. These methods comprise all hygienic, dietetic, climatic, hydropathic and medicinal measures applied at home, or elsewhere.

We know further that specific resistance, or in other words immunity is a phenomenon which develops only in response to specific influences, in the nature of products or substances of pathogenic bacteria which stand in etiological relation to an infectious disease, which in tuberculosis is the tubercle bacillus, and that this specific resistance can be acquired by having the disease, or by the artificial introduction of the products or substances of the related specific germ.

We further know that in tuberculosis, the acquired degree is but slight and, as a rule, insufficient to lead to spontaneous recovery, and that it is desirable to augment, improve or increase this lack to the greatest degree possible.

Specific treatment in tuberculosis has this for its object, and only those who find no necessity for anything beyond the increasing of the general resistance by food, open air, control of patients, climate, general hygiene, etc., can afford to ignore it.

We, ourselves, do not belong to this class. On the contrary we are of the opinion that both general and specific resistance are necessary for the best results and that they supplement one the other to the greatest advantage. We base this opinion on an experience with a clinical material that is ample, and is not approached in number of cases treated

with specific remedies by that of other single observers in this or any other country.

We likewise believe that the various specific products that we have used beginning with tuberculin in 1890 have all given us material aid, and we have demonstrated this by the clinical results which we have obtained since, and before we resorted to their use.

We have freely and repeatedly published all that concerns the nature, preparation and administration of the particular preparation which originated in our own laboratory and with which we as well as others have obtained the best results without having observed the slightest sign of an unfavorable effect, much less danger in its application.

While we have failures to regret we have here brought together clinical results in 3349 cases treated, that cannot be ignored nor contradicted by reference to Professor Koch's original introduction of tuberculin as a fiasco, and by men who have neither personal experience nor interest sufficient to acquire the necessary information to judge it by careful studies or even by a thorough examination of the literature.

To the latter the best clinicians have contributed and are still contributing most favorable reports from the use of the old and the new tuberculin and we hope at a not very distant day to lay before the profession a critical study of an enquiry into the entire subject of specific medication from its first beginning.

In conclusion we may add that we have not yet given up our endeavors for further improvement of this method of treatment by finding a still better preparation, or by improving further the one we now use.

During several years past we have carried on studies for this purpose of the chemical constituents of the tubercle bacillus and within that time we have succeeded in isolating a muco-protein in pure form, upon which the action of the old tuberculin depends. We have conducted animal experiments with various combinations of substances obtained in these studies and more recently we have succeeded in isolating a new protein giving entirely different chemical reactions from any heretofore found by ourselves or described by others, and which we hope may prove of value.

A study of the immunizing and therapeutic value of some of the fatty wax-like substances extractable by ether, alcohol, chloroform, etc., is likewise in progress and we hope that eventually these several studies may bear fruits that will be of practical benefit.

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